

## Promoting HOTS via ICT in ESL Classrooms

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### ABSTRACT

The introduction of the Malaysia Higher Education Blueprint (2015-2025) reinforced the Ministry's central aspiration to redesign a higher education system which rivals the world's leading education systems and which empowers Malaysia to compete in the global economy by specifically promoting Information and Communication Technologies (ICT) and innovations that address students' needs and allows greater personalisation of the learning experience (Ganapathy et al. 2016). "Teachers lack pedagogical knowledge in having the expertise to innovate their practices by integrating higher order thinking skills (HOTS) in their lessons which does not concur with the HOT questions posed in their examinations and assessments", (Ganapathy & Kaur, 2014). ESL teachers are facing challenges in teaching HOTS as they prefer the simpler old school teaching method and they are only exposed to HOT pedagogies at a surface level. This paper highlights the impact of ICT on promoting HOTS among secondary school teachers in ESL classrooms. It is vital to acquire deeper insights into the current pedagogical practices used by ESL teachers, the types of ICT that they use in their classes, their views on the integration of these skills into the curriculum and the application methods of teaching and learning using ICT to promote Higher Order Thinking Skills (HOTS). In short, ICT has shaped the education setting and it does have the potential to promote HOTS in ESL classroom settings.

**Keywords:** Malaysia Higher Education Blueprint; information and communication technologies; higher order thinking skills; teaching; learning; English as a second language

### Introduction

With the rise of advanced digital communication, information and communication technology (ICT) improved the efficiency of delivering information. Hilbert (2015) stated that the evolution of technology is the key for social development. ICT created a competitive working environment for many careers. The workforce today is more efficient with the usage of technology. ICT has produced an information intensive industry which enabled almost anyone to achieve considerable success, as mentioned by David (2010). Technology have enhanced economy through the creation of easier communication methods. However, educational institutions today are still largely based on the industrial era, as stated by Bates (2015). There is a shift in teaching pedagogies to keep up with the 21<sup>st</sup> century world. Online learning is now a key component of many schools and universities, as stated by Allen and Seaman (2014). School teachers had to adapt themselves according to the 2017 Budget. English Language proficiency programmes are being prioritised such as the Cambridge English, Dual Language and Highly Immersive programmes (2016) which revolves around the utilisation of HOTS.

It is known that technology promotes educational improvement. Education development comes from coherent instruction and assessment which supports high quality learning through higher order thinking skills (HOTS) (Reigeluth et al., 2013). Many professional teacher development programs integrated design-based components with a learner centred- pedagogical model in their curriculums

(Levin & Schrum, 2013). This innovative approach gives teachers the opportunity for learning specific technologies which are in the context of their curricular needs. Therefore, teachers today have to be equipped with HOT pedagogical skills in schools in order to guide the students effectively. For teachers to teach HOTS effectively, they can promote HOT pedagogies via ICT. Free tablets were provided by the 2017 Budget to 430,000 teachers in order to reduce their workload (Malaysia Budget 2017). These tablets enable teachers to utilise ICT better, such as for planning HOTS activities in the ESL classroom.

The utilisation of ICT in teaching the current HOTS based curriculum can improve the effectiveness of classes in schools. Many teachers are still not aware of the importance of HOT pedagogical knowledge. English language teaching today have yet to reach the targeted benchmark (ICFES, 2009). However, teachers must be flexible and receptive to change because they have to adapt to the changes in this transformation. Levin and Schrum (2013) discovered that schools with successful technology implementations managed to change the way teachers teach the curriculum and improved their teaching. Glassett and Schrum (2009) describe this use of technology as transforming learning routines, which includes accessing advanced learning resources and content, igniting cognitive processes that enhance learning (e.g., active inquiry vs. memorisation), and changing teacher roles from simply delivering the information to a facilitator.

ICT plays a key role in enriching classroom activities and learning experiences. According to Subran (2011), the efficiency of promoting HOTS using ICT have been confirmed and the main advantages in using ICT to promote HOTS is that it promotes sharing, interactivity and collaboration among individuals with the same goals. Educators today acknowledge the importance of implementing critical thinking activities in the classroom as these critical thinking skills are crucial for the future of the students. The development of critical thinking skills in a course curriculum is a change of the current practice (Stroupe, 2006). The focus given to the topic within the teaching literature are not optimal as they lack in systematic, empirically based teaching methodology for teaching critical thinking in classes (Dunn, Halonen, & Smith, 2008; Hooks, 2010). Many Malaysian students and graduates are perceived as 'unfit' for employability as they are inexperienced in thinking skills and soft skills (Morshidi Sirat et al., 2008).

There is a dilemma on teachers' knowledge of HOT pedagogy in terms of guiding students to learn ESL by integrating HOTS (Tan, 2015). Improving the thinking curriculum in order to foster proficiency for all students is a significant education challenge (Zohar, 2013). The Preliminary Report of the Malaysia Education Blueprint 2013-2025 mentioned that English teachers in schools did not sufficiently engage students in HOTS because teachers are still more comfortable in teaching the lecture format. The learning focus was still directed at only achieving surface-level content understanding rather than cultivating HOT (Malaysia MOE, 2012). Teachers today acknowledge the power of ICT and its ability to promote HOTS effectively but they are still not well-exposed to HOT pedagogies which limits their ability to promote HOTS via ICT.

Constructivist environments in Malaysia assisted teachers to integrate HOTS into their lessons and students to learn HOTS better (Sultan, Woods and Koo 2011). However, teachers still did not use sufficient HOT pedagogies in their lessons. In Malaysia, lower order thinking skills are being prioritised over HOT teaching methods and learning outcomes (Zohar, 2013). There is a gap between the reliance on assessment strategies which only focuses on memorising knowledge instead of involving a multitude of critical thinking skills. This gap raises a question as to whether HOTS are taught to educators themselves and are they ready to teach students beyond the mere memorising syllabus (Moir, 2013). As 60% of the public examination questions will test students' HOT abilities, it becomes mandatory for teachers to equip themselves with HOT pedagogies (Vision 2020 MOE, 2000). As ICT is able to promote the teaching of HOTS in the ESL classrooms, teachers today have to be well-equipped in ICT knowledge as well.

## **Theoretical approaches to HOTS**

Bloom's taxonomy is a learning taxonomy made by Benjamin Bloom (1956, cited by Marzano & Kendall, 2006). It is used to interpret the student's level of thinking skill. The revised Bloom's taxonomy (2011) consists of six levels of thinking skills which are sequentially arranged into a hierarchy. Creating is the highest level which means rearranging the parts in a new and original way.

The second level is evaluating which can be defined as the comparison to the standard of a judgment as to good, better or best. The next level is analysing information which is the capability to differentiate and notice the patterns and relationships in the organisation of connected parts. The following level is applying, which is the ability to use information in certain ways such as writing and interpreting. The second lowest level is understanding which means the individual is able to put together old and new knowledge and describe an original, well-integrated whole. The lowest level in Bloom's Taxonomy is remembering which refers to the ability to recall information

Bloom's taxonomy of learning is a continuum ranging from lower-order thinking to higher-order thinking, the higher-order thinking skills consists of the three upper levels in the learning hierarchy: analysis, synthesis and evaluation. Resnick (1987) mentioned that HOTS is complex and not easily defined but its characteristics can be identified in practice (as cited in Fisher, 1999). HOTS yield multiple solutions and viewpoints and it involves uncertainty. HOTS involve the process of making meaning while the usual routine teaching only involve the process of doing work. HOTS require more effort to be taught and learned as it requires significant mental work. Barahal (2008) asserted that HOTS involve 'artful thinking', which includes reasoning, questioning and investigating, observing and describing, comparing and connecting, finding complexity, and exploring viewpoints. Brookhart (2010) mentioned that HOTS is the thinking about life outside of school where thinking is characterised by 'a series of transfer opportunities (rather) than as a series of recall assignments to be done'. Time is required to promote HOTS in the ESL classroom as it is more complex compared to lower order thinking skills. However, teachers today have to change their old-school lecture based format into an actively engaging classroom with the students to promote HOTS which can be done easier through ICT.

Piaget's (1936) theory of cognitive development mentioned that intelligence was not a fixed trait. Piaget mentioned that cognitive development is a process which happens due to biological maturation and interaction with the environment. Critical thinking skills are the product of cognitive processes which have significant differences from basic repetition and memorisation of information (Morgan, 1995). This conceptualisation is in line with the cognitive domain in Bloom's (1956) taxonomy, which puts higher level thinking at one end of a continuum opposed by understanding and recall of basic information. Ennis (1985) stated that 'critical thinking focuses on the practical side of higher order thinking (HOT)'. Although Bloom's taxonomy explains the general cognitive domain (Ennis, 1985), the continuum gives numerous insights when critical thinking is accepted as a specific higher order process. Factual knowledge in lower order thinking suggests that including critical thinking instruction within subject matter instruction – infusion and immersion approaches (Ennis, 1989) which gives the crucial input for cognitive processes.

Cognitive skills play a critical role in critical thinking which showcases the importance of structuring educational experiences in giving an independent practice when carrying out cognitive activities (Mayer, 2004; McKeachie, 1992). Hastily incorporating critical thinking into a lecture format will only entice passive memorisation linear information (Maiorana, 1990). Nevertheless, the time and effort needed to implement critical thinking discourages most teachers (Gray, 1993) in making a balance between subject matter instruction and critical thinking (Coles, 1993). HOTS can be acquired by students when they are able to give critical judgment on their learning topics in the ESL classroom. As intelligence is not a fixed trait, students should be able to evaluate, analyse and create knowledge when they are exposed sufficiently to HOT pedagogies in the ESL classroom.

The two types of constructivist learning approaches are guided instruction and inquiry-based learning. Problem-based learning is the structured educational approach consisting of large and small group discussions (Schmidt & Loyens, 2007). Problem-based learning starts with the educator presenting a series of carefully constructed problems or issues to a few students (Schmidt & Loyens, 2007). The problems or issues pertaining to the phenomena or events which the students possess limited prior knowledge (Schmidt & Loyens, 2007).

In the educational setting, problem-based learning allows students to actively construct individual understandings of a topic using both prior and newly acquired knowledge (Schmidt & Loyens, 2007). Through problem-based learning, students can develop self-directed and group learning skills

which ultimately facilitates the comprehension of the problems or issues (Schmidt & Loyens, 2007). The utilisation of constructivist theories in educational settings are proven to promote HOTS such as problem-solving and critical thinking (Li et al., 2013). The learning environment in schools provide learners with different opportunities for them to try out their conceptual understanding in variety of applied circumstances such as solving problems (Chan, 2002). It is the educators' responsibility to form these constructivist approaches which allows students to engage in these situations: reflection, and self-examination (Abdul-Haqq, 1998). ICT is the solution to patch up the traditional pedagogical approach. The cognitive tools do not require intelligence (Derry & LaJoie, 1993; cited in Chan, 2002) as it requires the user to input the intelligence.

Educational institutions in developing countries are on their goal to combine old and modern technologies to be implemented in their classrooms (Kundi & Nawaz, 2010). Connecting the theory of constructivism in learning with the instruction practice helps in improving students' learning and understanding (Savery & Duffy, 2001). Petko (2012) mentioned that there is a need for better understanding of whether constructivist beliefs should be linked with vast usage of digital media, or will ICT be just as important in traditional educational settings. Group discussions can be planned better with the usage of ICT as students are able to connect with one another actively through the Web. This will promote active learning as students are finding the answers themselves instead of relying on the teachers.

Vygotsky stressed on the connections between people and the socio-cultural context (Marsh, 2010). The interaction between teachers and students of learning and teaching activities within schooling environment is crucial to the acquisition of HOTS. Teachers use the scaffolding concept in assisting learners to acquire knowledge and skills. Within the Zone Proximal Development (ZPD), learners are guided in numerous ways to achieve their learning objectives. Scaffolding is a process which a more knowledgeable person, such as a teacher helping a less knowledgeable learner by giving assistance to the learner.

According to Cairney (1995), Vygotsky's theory mentioned that HOTS can only be acquired by students through interaction with others before they are able to utilize HOTS independently. Sawyer (2006) mentioned that scaffolding is important for the zone of proximal development (ZDP). Scaffolding is the appropriate assistance given to students in a learning routine and helps them zone in on their learning objectives. Sociocultural interaction creates a comfortable learning place which helps students to achieve teaching and learning outcomes. Teachers should design and provide scaffolding such as modelling, guidance, and hints to assist students in learning (Hassaskhah, 2011).

ICT allows students to interact with one another effectively and allows easier active group discussions. Following the sociocultural theory, teachers can assist students through ICT by engaging them in active learning environments. This will enable teachers to promote HOTS easier as ICT encourages students to actively search for answers themselves instead of relying on passive information. Teachers' role in HOT activities are only as a guide as students will be able to apply, analyse and evaluate information easily by searching for information via ICT as proven by Barak et al.'s (2007) study.

### **ICT Orientations towards promoting HOTS**

Subran (2011) stated that the efficiency of promoting HOTS using ICT have been confirmed. The usage of ICT to promote HOTS increases sharing, interactivity and collaboration among individuals with the same goals. Critical thinking is now the crux for students to succeed in life and ICT is the main platform which is able to promote HOTS. Wheeliham (2011) mentioned that creativity and innovation are the key to thrive in today's digital era. The power of ICT enables tons of creativity and innovation such as including activities which engage students with various contexts. Therefore, HOTS is better learned and taught through the usage of ICT as highlighted by Ali (2012).

ICT can be used to process, store and disseminate information, facilitating the performance of information-related human activities, provided by, and serving the institutional and business sectors as well as the public (Cohen, Salomon & Nijkamp, 2002). The utilisation of ICT includes the usage of general hardware and application software, curriculum/subject-based software, the web, and multimedia tools by the teachers in their classes (Ali, 2012). ICT therefore allows more room for

creativity and innovation in promoting HOTS as students will be able to collaborate and actively search for their own answers through the usage of ICT.

Lincoln (2008) asserted that more focus on ICT helps to motivate students and can easily catch their interest on the topic. From Lincoln's study, ICTs were utilised to incite effort and perseverance for continuous engagement in thinking and learning. The application of ICT had improved students' performance. Majumdar (2015) illustrated the fact that the use of ICT is transforming the nature and process of the learning environment into a new culture in his article "Emerging Trends in ICT for Education & Training".

The Ministry of Education had made efforts for promoting thinking skills in Malaysian educational institutions (Ali, 2002) by introducing the i-Think programme, a joint programme with Agensi Inovasi Malaysia (AIM) which aims to develop student thinking skills and to facilitate learning among students in primary and secondary schools in 2013 (Tenth Malaysia Plan, 2011). Computers can assist learners in memorising. ICT can optimize the students in improving and expanding their thoughts on their study subjects (Chan, 2002).

### **Pedagogical Approaches in Promoting HOT Pedagogy in English Language Learning**

A study by Ganapathy and Kaur (2014) discovered that teachers lack pedagogical knowledge and the expertise to innovate their practices by integrating HOT skills in their lessons. From the study, the teachers are not well-equipped to teach HOTS in the ESL classroom because they are not well-equipped to teach HOT pedagogies, which resulted in the students' inability to answer the HOTS-focused questions in the exams. This finding reflects that there is a gap in the implementation of HOTS. In the project, the teachers were encouraged to teach information by using real-world contexts and change it according to skill levels. Students can apply the knowledge gained and internalise the abstract conceptual implication by being exposed to a variety of contextual settings. This past study highlighted that teachers should teach in contexts which advocate several skills: build background knowledge, classify information into categories, arrange items along some dimension, make hypotheses, draw inferences, analyse information into components, solve problems and students should also be aware of the strategies they used to analyse, classify or arrange information. It was found from the study that teachers have an important role in ensuring that their pedagogical practices integrate the subject matter HOTS which facilitate students' engagement and grab their interest at the same time. Taking this factor into consideration, teachers' creativity can be reinforced by engaging students with real world problems to cultivate the students' HOTS. Ganapathy and Kaur (2014) mentioned that teachers have to ensure their assessments and classroom exercises should include realistic contexts and problems to promote HOTS among students in the ESL classroom, such as application skills. In the study, the majority of students were interested and fascinated to use Facebook to look for information by chatting with friends. This proves that ICT is capable of promoting HOTS as students are actively searching for information and managed to analyse them as they were able to obtain lots of information through the Internet. Ganapathy and Kaur's study (2014) found that students were engaged and motivated in the learning process which includes all the domains in Bloom's taxonomy.

Fischer et. al (2011)'s study found contradictory results. The study highlighted the amount of concentration teachers give to HOTS during their teaching and planning. Although the respondents mentioned that they highlighted HOTS in their lessons, the quantitative findings do not match what was being observed during their teaching. Some teachers stated that they provided appropriate wait time during class discussions and almost every teacher in the study mentioned that "deeper discussions" were frequent in their class discussions. However, sufficient wait time was not frequently recorded in the observation data. While teachers acknowledged the value of instruction for thoughtfulness, their responses showed that they only understood it at a surface level. Experience in teaching, assessment training as well as exposure to HOTS will increase the teacher's grasp of HOT pedagogies. (Hargreaves, Earl, & Schmidt, 2002; Mertler, 2000; Stiggins, 1992). Past research has shown that the lack of training and exposure is the reason why teachers are reluctant to focus on HOTS in their lessons. As teachers are only exposed to HOT pedagogies at the surface level, they have to update themselves on the latest

curriculum and introduce HOT activities in the ESL classroom via ICT. Time is a limitation which discouraged teachers from integrating HOTS into the classroom. However, ICT enables teachers to engage students in group activities featuring HOTS, especially in real-life contexts. Therefore, HOTS can be better learned and taught through the usage of ICT as highlighted by Ali (2012) and Yee et al. (2012).

In Barak et al.'s study (2007), teachers mentioned that critical thinking is a way of organising thinking, basing it on logic orderly. Teacher expect their students to be able to use critical thinking while solving a problem in a systematic way and students are expected to be able to make assumptions and draw conclusions based on their prior knowledge learned in class. Only a few of the teachers in the study proclaimed that they use teaching strategies that promote HOTS among the students. The teachers who did try to promote HOTS also mentioned that it is challenging to conceptualise HOTS. The results of the study found that there are three teaching strategies identified to be able to promote HOTS: dealing in class with real-world cases; encouraging open-ended class discussions, and fostering inquiry-oriented experiments. These strategies can be conducted easier through the usage of ICT and they have been proven to be effective in promoting HOTS in this past study.

Pandian and Moorthi (2003) conducted a study to investigate the English literacy behaviour in teacher training colleges in Malaysia. They discovered that teachers support the integration of ICT into education. Past studies shown that teachers have the knowledge and experience to use ICT. However, teachers are not well-versed in using computers for educational activities such as using the World Wide Web for research purposes. Today, we need to promote literacy practices among young teacher trainees who are expected to be well equipped with techniques in utilising ICT to meet the 21<sup>st</sup> century expectations in education. Another study by Pandian (2006), focused on English Language trainee teachers regarding their computer literacy knowledge. The study found that ICT is a core component to supplement ESL teaching. Pandian (2006) mentioned teachers should possess IT knowledge and they should be able to use ICT for teaching in their classes.

Teachers have to well-versed in ICT to teach students who can meet the future expectations of the world. Pandian (2006)'s study shown that teacher trainees who are in teacher training colleges in Malaysia are lacking in the desired IT traits which are mandatory for educators today. From the study, it is shown that teacher trainees lack the interest in utilising IT for academic purposes. The reason for their ignorance was proven to be insufficient interest among teacher trainees to navigate information which is the key for success in today's education. Old school teaching methods are no longer relevant for producing successful students. As mentioned by Pandian (2006), teachers trapped in traditional teaching and transmitting of teacher-centred information to students will only manage to produce people without the necessary critical skills to excel in today's modern world.

Ali's study discovered that most lecturers have moderate and advanced levels of ICT knowledge and skills. The lecturers are exposed to application software such as desktop applications, presentation software, Internet applications, and media communication. This discovery contradicts with a past study conducted by Bakar and Mohamed (1998) in Malaysia. The earlier study found that teachers were not literate in the use of computers or computer software. A USA study by Kotrlik, Harrison, and Redmann (2000) on vocational teachers found that vocational education teachers had moderate to low levels of general information, technology knowledge, and skills. The rapid growth and advancement in ICT could be the reason for these inconsistencies as ICT is slowly becoming a bigger part of our lives. It is clear that teachers are still not completely equipped to utilize ICT as they are still not completely equipped with the necessary skills, knowledge, and confidence (Russell, Finger, & Russell, 2000)

## **Conclusion**

Implications of this paper helps to validate that ICT has the potential to promote HOTS in the ESL classroom setting. The usage of ICT in the ESL classroom enables a wide range of HOTS activities Ali (2012) asserted that HOTS can be better learned and taught through the usage of ICT. Yee et.al (2012) stated that HOTS should be taught to students in the ESL classroom as they are bound to face the HOTS focused examinations. Teachers today tend to rely on the now outdated lecture methods and teacher-centred approaches. Active methods of learning should be promoted by teachers in the ESL classroom as they will help students in acquiring the necessary HOT skills. Using the constructivist approach, teachers can promote HOTS through problem-based learning activities which can engage students' past and newly acquired knowledge, such as in group discussion. Following the sociocultural theory, teachers today should not provide passive answers to students. Instead, teachers should act as guides to students in achieving the learning outcomes. Teachers should change from a teacher-centred context into a learner-centred context which means teachers should act as facilitators to students instead of passively giving direct answers without HOTS being involved. ICT allows numerous possibilities of promoting HOTS in the ESL classroom. Teachers have to update themselves with HOT pedagogies and ICT knowledge in order to effectively teach HOTS. Wheeliham (2011) stated that creativity and innovation are the main requirements to achieve success in today's digital era. ICT enables students and teachers to actively create and innovate information actively. Hence, ICT can effectively bolster learners' grasp of HOTS. HOTS is becoming increasingly important as many individuals fail to obtain jobs due to their lack of exposure to critical thinking skills. ICT has the potential to promote learner engagement and active learning in the ESL classroom. Therefore, HOTS can be better taught through the usage of ICT in the ESL classroom.

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